## Reanalysis of Ichinohe's Observations of RU Cam

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The W Vir-type variable star, RU Cam, once claimed to have stopped pulsation (Demers, Fernie 1966; Huth 1966), has been known to show irregularly variable amplitude (Kollath, Szeidl 1993). Sato et al. (1997) has also shown from the analysis of the VSOLJ archive that visual observers of the VSOLJ have recorded the cessation of pulsation and its possible resumption, together with the phase of large-amplitude variation around 1910. The observations around 1910 were done by Ichinohe, a part of which was published by the observer himself (Ichinohe 1909). We present the result of reanalysis of Ichinohe's original data until 1911, by using the Hipparcos V-magnitudes of the comparison stars.

The original observational records using Pogson's step method were first analyzed by a least-squares program (Kato, in preparation) to obtain the best step values of the comparison stars and the variable star. The resultant step values of the comparison stars were used to calibrate the original observation into the Hipparcos V system. Table 1 summarizes the result of best determined step values of the comparison stars.

A least-squares fit of the step values to the Hipparcos V-magnitudes yielded the following conversion equation.

$$V = 8.70 + 0.191 \cdot step \tag{1}$$

By using this, we have reduced the original observations to the present Hipparcos V-scale. The result is tabulated in Table 2.

During this reduction procedure, possible inconsistencies were found among Ichinohe's (1909) step reduction for JDs 2417949.206, 2417962.941, 2418390.133 and 2418413.047. We consistently used our new values in the following analysis.

After heliocentric corrections, the data were analyzed using the Phase Dispersion Minimization (PDM) method (Stellingwerf 1978) to obtain the pulsation period. The resultant theta diagram is shown in Figure 1. The best determined period of 22.18 d, which confirms the analysis by Ichinohe (1909), well agrees with the 22.187 d period given before 1917 (Huth 1966).

The averaged light curve constructed from these observations is shown in Figure 2. The epoch of the light maximum was rather arbitrarily taken as HJD 2419150.085. Each point represents an average of 0.1-phase bin, typically constituted of  $\sim 10$  observations, and vertical bar 1-sigma error. The range of light variation was 8.26 (0.06) – 9.33 (0.08), giving an amplitude of 1.07 (0.10), which also confirmed the earlier reports. Our new analysis, however, rather disproves the existence of the secondary maximum which Ichinohe (1909) described, giving a more consistent, typical W Vir-type, light curve with those of other observers at that epoch.

Table 1. Comparison stars

Desig.	BD	Steps	Hipparcos V	O-C*
a	$+70^{\circ}450$	0.00	8.75	0.05
$^{\mathrm{c}}$	$+70^{\circ}447$	1.33	9.05	0.10
d	$+69^{\circ}422$	-3.40	8.04	-0.01
e	$+69^{\circ}420$	1.44	8.90	-0.07
b	$+70^{\circ}448$	2.29	9.06	-0.08
g	$+70^{\circ}445$	5.29	9.85	0.14
f	$+70^{\circ}453$	4.54	9.43	-0.14

<sup>\*</sup> Residuals from eq. (1)

Table 2. Ichinohe's observations

JD-2410000	mag	JD-2410000	mag	JD-2410000	mag
7649.547	8.69	7743.796	9.13	8364.126	8.89
7650.805	9.12	7746.817	8.90	8368.954	9.06
7651.823	9.08	7747.822	8.74	8390.133	9.09
7652.708	9.21	7749.846	8.25	8392.944	8.75
7654.726	9.47	7759.819	8.37	8405.003	8.99
7657.799	8.78	7762.650	9.30	8406.051	9.57
7658.645	9.06	7763.797	9.18	8413.047	8.99
7658.646	9.06	7881.059	8.64	8422.085	8.61
7664.665	8.37	7889.149	8.43	8424.165	8.25
7665.646	8.47	7890.073	8.24	8445.040	8.65
7666.584	8.48	7904.153	8.64	8446.042	8.56
7667.588	8.71	7945.240	9.07	8450.061	8.94
7668.605	8.74	7949.206	8.48	8450.961	9.35
7668.653	8.70	7950.060	8.44	8526.285	8.47
7671.611	8.88	7950.988	8.44	8538.253	8.35
7671.726	8.95	7957.108	8.32	8558.232	8.55
7671.826	9.07	7962.941	8.95	8664.018	7.80
7675.591	9.53	7966.037	9.18	8714.062	8.56
7676.586	9.79	8057.105	9.12	8738.181	8.96
7679.625	9.41	8117.068	8.86	8920.202	8.74
7680.709	9.01	8148.997	8.44	8951.024	8.97
7682.697	8.61	8168.163	9.07	8971.126	8.06
7685.835	8.00	8173.192	8.22	8982.881	8.93
7686.631	8.50	8174.209	8.32	9028.997	9.43
7687.600	8.38	8175.125	8.42	9053.913	8.99
7689.715	8.37	8181.199	8.47	9061.997	8.41
7703.648	8.76	8183.074	8.54	9062.985	8.41
7704.697	8.55	8211.088	9.05	9072.997	9.24
7705.628	8.37	8212.120	8.91	9088.180	8.31
7706.709	8.19	8215.051	8.26	9090.235	8.54
7708.680	8.22	8216.942	8.43	9103.001	8.51
7713.830	8.04	8306.160	8.38	9122.115	8.99
7723.681	9.43	8311.021	8.51	9128.115	7.99
7724.642	9.14	8324.217	8.78	9147.110	8.56
7728.690	8.42	8331.152	8.26	9150.087	7.80
7735.672	8.36	8336.140	8.76	9160.098	8.75
7740.667	9.09	8337.056	9.21	9183.034	8.92
7741.774	9.08	8354.965	8.33		
7742.732	9.40	8359.182	8.80		

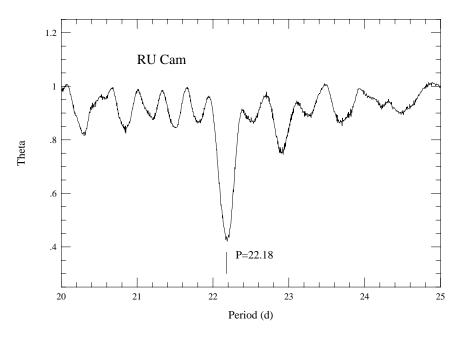


Figure 1: Period analysis of RU Cam

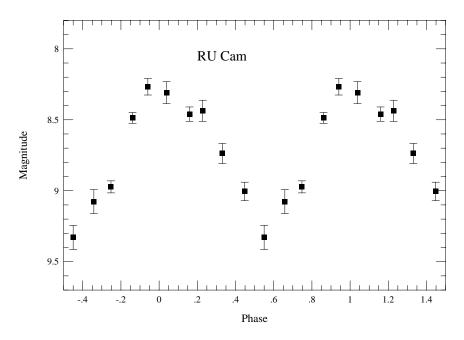


Figure 2: Averaged light curve of RU  $\operatorname{Cam}$ 

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